AMTAST AMT611
Lab pH Meter
User Manual

Amtast USA Inc

Contents

1 Introduction

1.1 Introduction

Amtast AMT611 lab benchtop pH meter can be widely used in universities, environmental protection, medicine, food, health, geological prospecting, metallurgy, marine exploration and other fields, common acid rain detection, industrial wastewater, surface water, drinking Water, beverages, daily chemical products, textiles, etc. All these fields require pH and electrode potential (mV) value measurement.

✧ **General Features**

- LCD display screen, 6.0 inches.
- It measures pH and mV with continuous-read.
- Manual temperature compensation ensures accurate results.
- 1-2 points calibration with auto/manual calibration.
- Automatic recognition of 4.01pH, 7.00pH and 10.01pH pH standard buffer solutions.
- Manual calibration allows to custom standard solution.
- Automatic electrode diagnosis with pH slope display.

1.2 Technical Specification

Table 1-1 Instrument Specifications

Model		AMT611
mV	Range	(-1400 ~ 1400)mV
	Resolution	1mV
	Accuracy	±1%FS
	Repeatability	5mV
	Input Current	$\leq 1\times10^{-11}$ A
	Input Impedance	$\geq 3\times10^{11}\Omega$
pH	Range	(0.00 ~ 14.00)pH
	Resolution	0.01pH
	Accuracy	±0.05pH
	Repeatability	0.02pH
	Measurement Accuracy	±0.1pH
	Measurement Repeatability	0.05pH
Temperature	Range	Manual (0.0 ~ 60.0)°C
Work environment		Ambient temperature: (0 ~ 40)°C Relative humidity: not more than 85%
Dimensions(L×B×H), Weight(kg)		200mm×160mm×63mm, About 0.6kg
Power supply		Refer to the label on the power adapter for specifications.

1.3 Function Introduction

Table 1-2 Main functions

Function		Explanation
Basic Function	Backlight Power	●
	Reset settings	●
	Power failure protection	●
	Automatic shutdown	●
Reading Function	Reading Mode	Continuous-read
pH/mV	PH electrode status/performance display	●Slope
	Calibration point	1~2
	Automatic identification of standard solutions	4.01pH, 7.00pH and 10.01pH
	Custom standard solution	Manual
	Manual temperature compensation	(0.0 ~ 60.0)°C
Temperature	Temperature unit	°C

● Equipped

2 Safety Notices

Please read the entire contents of this manual carefully before use, and please keep this manual properly. The user **MUST** use the instrument following this manual to avoid damage to the user and equipment.

Before using the meter, **READ** the following notes:

- **DO NOT DISASSEMBLE** the device for inspection or repair.
- To prevent electric shock or damage to the device, **DO NOT** place cables and connectors in any liquid, wet or corrosive environment.
- Please use the defaulted power adapter
- **DO NOT** use it if the power cord is damaged (the wire is exposed or broken).
- **DO NOT** use in flammable and explosive environments.
- **DO NOT** use if the user finds any abnormalities such as damage or deformation of the device.

The following identifiers will be used in this manual.

【TIPS】

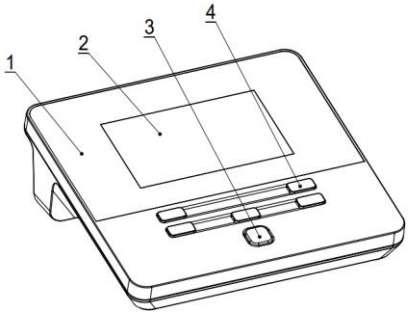
Tips help to use the meter.

3 Terms Explanation

- **pH Slope:** The amount of potential change generated by each 1 pH change, expressed in mV/pH or by 100% Theoretical Slope (PTS). pH = - log[H], where [H] means molar concentration (mol/L) of H ions.
- **E0 of pH:** Also known as "zero potential", usually refers to the potential value at pH 7.
- **One-point calibration:** Calibration with a standard solution.
- **Two-point calibration:** Calibration with two standard solutions.

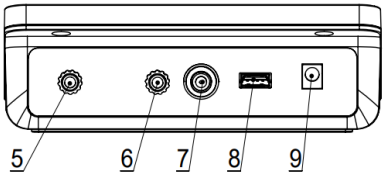
4 Overview and Installation

4.1 AMT611-1 Overview



1. Meter Body
2. Display
3. Power Key
4. Function key

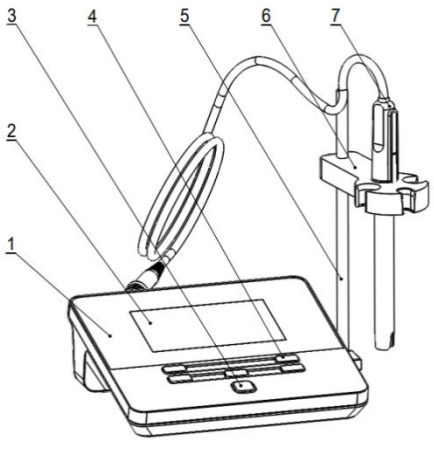
Figure 4-1 AMT611-1 Overview-Front View



5. Ground terminal
6. pH electrode socket
7. Reference electrode socket
8. Debug port
9. Power socket

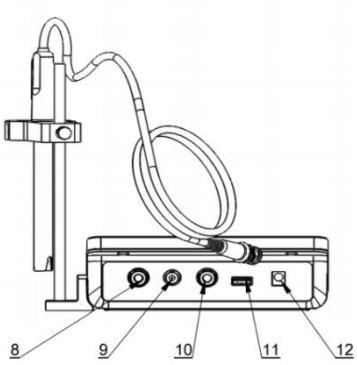
Figure 4-2 PAMT611-1 Overview- Back View

4.2 AMT611 Overview



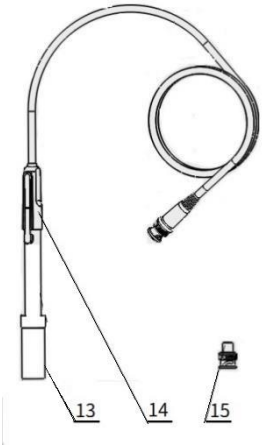
1. Meter Body
2. Display
3. Power Key
4. Function selectionkey
5. Electrode stem
6. Electrode clip assembly
7. Electrode

Figure 4-3 AMT611 Overview-Front View



8. Ground terminal
9. pH electrode socket
10. Reference electrode socket
11. Debug port
12. Power socket

Figure 4-4 AMT611 Overview- Back View



13. Electrode protection cap
14. pH electrode
15. Q9 short-circuit plug

Figure 4-5 Electrodes and connectors

4.2.1 Electrode Stand Installation

1) Screw the electrode stem into the screw hole of the insert plate.

2) Insert the round hole at the back of the electrode fixing clip into the electrode stem, adjust the height, and tighten the fixing screw.

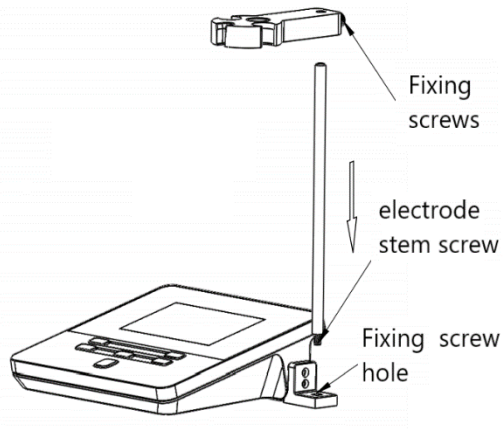


Figure 4-6 AMT611 Electrode Stand Installation

4.3 Electrode Connection

Push the pH electrode into the electrode holder. Remove the protector cap of the pH electrode. Connect the pH electrode to the right socket.

5 Instrument Operation

5.1 Screen Icons

The meter uses segment LCD as the display. The user interface has the menu, status, and result. The menu has measurements and settings. The status shows the reading mode, PTS and auto shutdown, etc. The result shows the pH, mV, unit, temperature, etc.

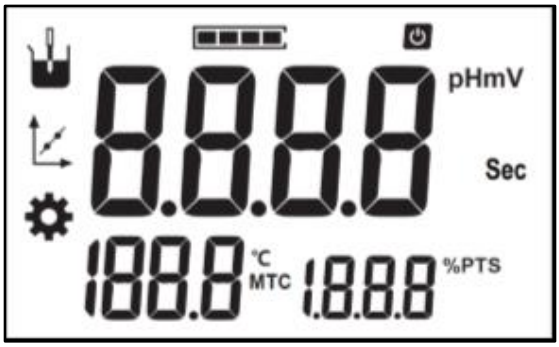


Figure 5-1 Screen icons explanation

Table 5-1 Symbol Explanation

No.	Symbol	Explanation	Note
1	▬▬▬	Reading state	All four segments are lit up in stable state
2	⏻	Automatic shutdown	Display when automatic shutdown is valid
3	mV	mV result unit	Unit: mV
4	pH	pH result unit	Unit: pH
5	Sec	Time unit	Unit: Sec

No.	Symbol	Explanation	Note
6	℃	Temperature	Unit: ℃
7	MTC	Manual temperature compensation	Represented by character string MTC
8	%PTS	Percentage slope value	Represented by character string %PTS
9		Measurement	
10		Calibration	
11		Setting	

5.2 Key Functions

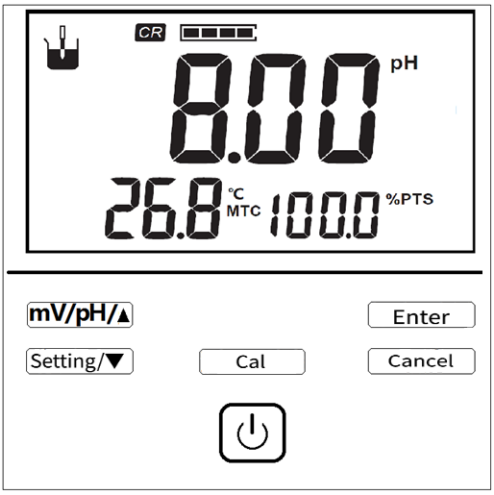


Figure 5-2 Instrument keys

Table 5-2 Key Function Explanation

No.	Key	Explanation	Note
1		Power key	■ Press to switch on the instrument. ■ Press and hold for more than 3 seconds to switch off. ■ Backlight adjustment.
2	mV/pH/▲	mV/pH/Up	■ Exchange the display of pH and mV. ■ Increase the number in the setting.
3	Setting/▼	Setup	■ Enter the setting function. ■ Decrease the number in the setting.
4	Cal	Calibration	■ Enter into the Calibration status.
5	Enter	Enter	■ Confirm.
6	Cancel	Cancel	■ Give up.

5.3 Instrument Settings

5.3.1 Switch On/Off

The meter uses segment LCD as the display. The user interface has the menu, status, and result. The menu has measurements and settings. The status shows the reading mode, reading prompts and

auto shutdown, etc. The result shows the pH, mV, temperature, PTS, etc.

Table 5-3 Characters displayed on the power operation interface

No.	Character display	Explanation
1	U2F	Switch On, Software Version
2	OFF	Switch Off

【TIPS】

1. Before switching on each time, please check the electrode sockets on the back of the meter, and make sure that they are connected with measuring electrodes or short-circuit plugs, otherwise it may damage the high-resistance components of the meter and bring you unnecessary losses.
2. When the meter is not in use, the short-circuit plug should also be connected to avoid damage to the meter due to the open circuit of the meter input.
3. If the meter is not used for a long time, please disconnect the power.
4. The socket of the meter must be kept clean and dry, and should not be in contact with acid, alkali or salt solution.

5.3.2 Settings

The meter has system parameter settings, such as temperature setting, automatic shutdown setting, and reset setting. The user presses the "Setting/▼" key, the meter will display the setting logo, SEL and serial number, the user presses up and down key to adjust, press the "Enter" key to select.

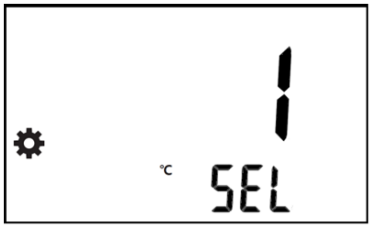


Fig. 5-3 Setting function display

Table 5-4 Set function list in the measurement status

No.	Explanation	Note
1	Temperature Settings	Flashing display °C
2	Automatic shutdown settings	Flashing display "APD"(Auto Power Down)
3	Reset settings	Flashing display "rSt" (Reset)and "dFt" (Default)

5.3.2.1 Temperature Setting

The meter doesn't support the connection of temperature electrodes, the user needs to use a thermometer to measure the temperature of the solution. Press the "Setting/▼" key to select the temperature setting function, press the "Enter" key, and adjust the temperature to the specified temperature value by up and down

key.

Figure 5-4 Setting temperature value display

5.3.2.2 Automatic Shutdown Setting

The meter provides auto shutdown function. When the meter is not using and set the auto shutdown, the meter switches off automatically. There are eleven options: off, 300 Sec, 600 Sec, 900 Sec, 1200 Sec, 1500 Sec, 1800 Sec, 2100 Sec, 2400 Sec, 2700 Sec, and 3600 Sec.

5.3.2.3 Reset Setting

When the meter is not working. Users can reset the meter from the default's backup. The default setting includes the electrode slope as 100%, the temperature as 25.0 °C, continuous reading mode, automatic shutdown as close etc.

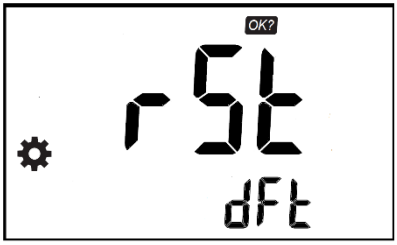


Figure 5-5 Reset settings

5.4 Calibration

5.4.1 Prepare Electrodes

Before using the pH electrode, please pay attention to the following items:

- Pull out the electrode protection cap at the bottom end of the pH electrode, and pull down the rubber sleeve at the upper end of the electrode to expose the small hole at the upper end.
- Clean the electrodes with distilled water.
- For details on the use and storage of the pH electrode, please refer to the electrode instruction manual.

5.4.2 pH electrode Calibration

The pH electrode has a certain drift in different use environments or when it has not been used for a long time, resulting in different electrode slopes and zero points. It needs to be re-calibrated with a standard buffer solution.

If the user needs to perform two-point calibration, two standard solutions must be prepared in advance. If only one-point calibration is required, only one standard buffer solution is required.

One-point calibration is suitable for the situation where the measurement accuracy is not high. At this time, the percentage slope of the electrode is taken as 100%. Usually, two-point calibration is used to improve the measurement accuracy of pH.

Generally, when the meter is used continuously, it is recommended to calibrate once a day.

Table 5-5 Characters displayed on the calibration operation interface

No.	Display	Explanation
1	Auto	Display when the standard solution is automatically identified, indicating Auto Recognition.
2	Non	Display when the standard solution is manually identified, indicating Manual Recognition.
3	Err	Display when calibration fails, indicating Error.
4	OH	Display when the confirmation is valid during calibration, indicating OK.
5	End	Display when calibration is completed.

Table 5-6 Error information

No.	Error Code	Explanation
1	Err1	Automatic identification of solution errors. Manual standard solution is not input.
2	Err2	Save failure. Electrode failure. The potential of the calibration solution exceeds the theoretical value.
3	Err3	The current calibration solution has the same potential as the previous calibration solution.

The meter supports automatic identification of standard buffer solutions, and can identify three standard solutions of 4.01pH,

7.00pH, and 10.01pH. Users can refer to the appendix to prepare pH standard buffer solution, or purchase market standard buffer solutions.

Prepare 1-2 standard buffers and deionized water as required to start calibration. The calibration steps are as follows (for reference):

1) In the measurement state, press the "Cal" key to enter the electrode calibration state (the default is automatic identification mode, the word "Auto" is displayed)
2) Rinse the pH electrode repeatedly with distilled water, put it in a certain standard buffer solution (such as 7.00pH standard buffer solution), the instrument displays pH value and temperature value (such as 7.00pH, 25.0°C).
3) Use a thermometer to measure the temperature value of the standard solution, press the "Temp" key and adjust to the specified temperature value (such as 25.2°C) with the up and down key.
4) Wait for the reading to stabilize, press the "Enter" key, and the meter stores the calibration data and displays the calibration result, that is, the nominal pH value at 25.2°C.

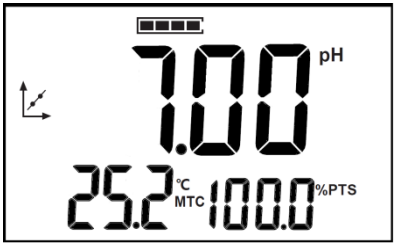


Figure 5-5 Calibration display

5) When performing multi-point calibration, repeat the process above, after cleaning the electrode, put it in other standard solutions, and then repeat the measurement of temperature and set the temperature value, and confirm after the data is stable. The meter supports up to 2-point calibration. When the user finishes calibrating 2 standard solutions, the meter will automatically end the calibration and return to the measurement state. If the user only needs to calibrate 1 point, you can manually press the "Cancel" key to terminate the calibration.

If the user uses a non-standard pH buffer solution to calibrate the electrode, the user must know the relationship between the pH value of the non-standard solution and the temperature in advance, that is, the nominal pH at a certain temperature, and then control the temperature of the constant temperature tank to make the standard solution reach specified temperature value.

Calibration steps are as follows (for reference):

1) Place the standard solution in a constant temperature tank, in which the temperature is controlled to a certain temperature value.

2) Long press the "Cal" key to switch to manual identification mode and display the word "Non",press the up and down key to set the nominal pH value at the current temperature.

3) Press the "Temp" key and adjust to the specified temperature value by the up and down key, and press the "Enter" key to complete the temperature value input.

4) After the data is stable, press the "Enter" key to complete the calibration.

【TIPS】

1. Standard pH buffer solutions are usually obtained in two ways, users can prepare or purchase standard solutions by themselves.

2. Customized: Please refer to appendix to prepare pH standard buffer

3. Purchase standard buffers: Users can also directly purchase certified standard buffers produced by professional manufacturers, very convenient. In order to facilitate the use of users and reduce a lot of work for users to prepare standard solutions, our company produces and prepares pH standard buffer solutions, which users can purchase directly. It is very convenient to calibrate the electrode with a standard solution before measurement.

5.5 Measurement

5.5.1 Measurement Preparation

Before measurement, the user should understand the properties and attributes of the substance (sample) to be measured.

The user needs to prepare the sample first, or the standard solution that needs to re-calibrate the electrode, etc.

5.5.2 Measurement

After pH electrode calibration, pH value and potential value of the solution can be normally measured.

The measurement steps are as follows (for reference):

1) Immerse the electrode in the solution to be measured.

2) Use a thermometer to measure the temperature value of the current solution, and then manually set the temperature value.

3) Wait for the data to stabilize, and then read the measurement results.

4) Press the mode key "mV/pH" to switch the mV value or pH value display.

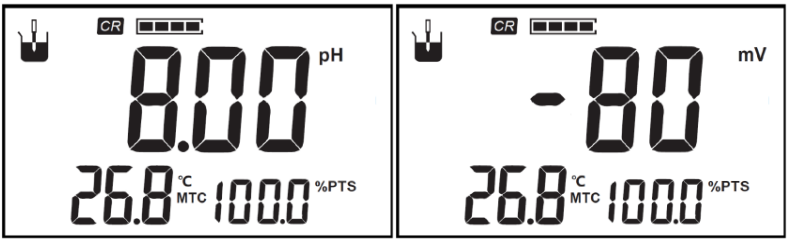


Figure 5-6 Measurement display

【TIPS】

1. To ensure accurate measurement, the sample volume in the container should be sufficient to ensure that the junction of the measuring and the reference electrode is completely immersed in the sample.

2. For accurate measurement, it is recommended that users calibrate and measure at the same temperature.

6 Maintenance and Troubleshooting

6.1 Maintenance

The correct use and maintenance of the meter can ensure the normal and reliable operation of the meter, especially the pH meter, which has a high input impedance and is easily damaged by static electricity and other electromagnetic interference. In addition, it will often come into contact with chemicals, and the use environment is relatively harsh, so reasonable maintenance is required:

- The measurement electrode socket of the meter must be kept clean and dry.
- After the electrode is disconnected, please connect the Q9 short-circuit plug to the socket to prevent high resistance damage.
- When calibrating the electrode with pH standard buffer solution, ensure the reliability of the buffer solution, otherwise it will affect the accuracy of the measurement results.
- The meter is equipped with a professional protective cover.
- Please use the defaulted power adapter.

6.2 Electrode Usage and Maintenance

For more detailed information, please refer to the electrode instruction manual.

6.3 Troubleshooting

Table 6-2 Troubleshooting

Phenomenon	Probable reasons	Solutions
No Display	Not turn on.	Check the power adapter.
Calibration failure	Poor pH standard solution. Poor electrode.	Recalibrate with fresh pH standard solution. Use new a pH electrode.
Unstable measurements	Electromagnetic interference.	Stop the electromagnetic interference.
Inaccurate measurements	Poor electrode. Calibration error.	Clean the pH electrode or use a new pH electrode. Recalibrate with fresh pH standard solution.
Slow measurements	Poor electrode. Low temperature.	Clean the pH electrode or use a new pH electrode. Wait for stability.

7 Technical Support

Please refer to the accessories table for purchasing recommendations.

Table 7-1 Meter accessories

Name	Description
E520BNC pH composite electrode	pH measurement
pH standard solution	pH4.01, 7.00, 10.01

8 Appendix

pH-Temperature Relationship Table of pH Standard Solution

Temperature(°C)	4.01	7.00	10.01
5	4.00	7.09	10.25
10	4.00	7.06	10.18
15	4.00	7.04	10.12
20	4.00	7.02	10.06
25	4.01	7.00	10.01
30	4.01	6.99	9.97
35	4.02	6.98	9.93
40	4.03	6.97	9.89
45	4.04	6.97	9.86
50	4.06	6.97	9.83